APPENDIX L
CATEGORICAL EXCLUSION SUMMARY

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The U.S. Department of Energy (DOE) National Environmental Policy Act (NEPA) Implementing Procedures identify classes of actions that DOE has determined do not individually or cumulatively have a significant effect on the human environment (10 *Code of Federal Regulations* [CFR] 1021, Subpart D). Appendix B of Subpart D, "Categorical Exclusions Applicable to Specific Agency Actions," identifies conditions that are integral elements of the classes of action that are categorically excluded. These conditions are that a proposed activity would not threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety or health, including requirements of DOE and Executive Orders; require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; disturb hazardous substances, pollutants, or contaminants that preexist in the environment such that there would be uncontrolled or unpermitted releases; or adversely affect environmentally sensitive resources. These classes of items are normally "categorically excluded" from the need for the preparation of an environmental assessment or environmental impact statement. The Los Alamos National Laboratory (LANL) experience has shown that there are groups of actions or activities that meet the standard for receiving a categorical exclusion from further NEPA. These activities range from facility work, such as routine maintenance and safety and environmental improvements, to research and development activities in chemistry, materials science, detector technology, geology, and other areas. The following sections describe the range and types of activities that are performed in Key or non-Key Facilities at LANL that would typically receive a categorical exclusion.

Routine Maintenance Activities

Maintenance activities are frequently and routinely performed for operational support of LANL facilities and property. These actions range from ongoing custodial services to corrective, preventive, and predictive actions required to maintain and preserve buildings, structures, roads, infrastructure, and equipment in a condition suitable for fulfillment of their designated purpose. Such activities are intended to maintain current operations and do not substantially extend the useful life of a facility or allow for substantial upgrades or improvements. Routine maintenance includes maintenance, repair, replacement, removal, relocation, fabrication, and installation actions.

Safety, Environmental, and Equipment Improvements

LANL staff routinely conducts safety and environmental improvements to facilities, including the installation of and improvements to equipment for personnel safety and health. This includes installation, replacement, or improvements to alarm systems and monitors, bottled gas racks, electrical components, guardrails, air and water filtration devices, safeguards and security equipment, nondestructive assay instruments, remote monitoring systems, emergency exits, radiation shielding, door interlocks, and similar systems. Facility safety risks are reduced by improving containment of hazardous materials, installing remote handling equipment, providing fire breaks and fire roads, and other related actions. Risks to the public are reduced by eliminating contaminants in outfalls, removing underground storage tanks, and installing water disinfection tanks, among other activities. Environmental improvements include minor operational changes and equipment additions or modifications that reduce the volume of waste produced, and facilitate reuse and recycling of materials.

Support Structure Activities

LANL staff constructs, modifies, and operates support buildings and other structures within or contiguous to developed areas. Support buildings and structures are those used for offices, health services, welding shops, storage space, vehicle maintenance, waste collection and staging areas, and other purposes. Construction and modification activities include providing elements needed for proper functioning of the structures, such as fencing, aboveground storage tanks, parking lots, utilities, and ducting. LANL staff constructs short new access roads and modifies existing roads to improve access to and within technical areas (TAs), to facilitate traffic and pedestrian flow, and to improve worker safety. New support buildings and structures are constructed, and existing structures (such as transportables, trailers, and tension domes), their contents, and processes are relocated. Support buildings and structures that are vacated and determined to be excess to current and foreseeable needs are decommissioned. Decommissioning may include decontamination activities and removal or demolition. Cultural resource evaluations are completed prior to demolition.

General Shop Operations

LANL activities and operations are supported by a variety of shops, including machine shops, carpentry shops, and electronics shops. Many different types of equipment are used, including drill presses, lathes, bench grinders, table saws, sanders, welding equipment, small power tools, hand tools, and other common shop equipment. Commonly used materials include nonhazardous metals, ceramics, wood, plastics, rubber, epoxies and glues, paint, solder, sealant, small quantities of cleaning solvents, and other common shop materials. Specialized shops may also use a variety of hazardous or radioactive materials in fabrication and construction.

Radiation Monitoring Techniques

Researchers develop and test techniques and instrumentation for nondestructive monitoring and detection of radiation sources. These nondestructive measurements work by detecting and analyzing radioactive emissions from nuclear materials. Both active and passive techniques are used to accurately measure the mass of nuclear materials in an object. Active techniques involve bombarding nuclear materials with neutrons or gamma rays, then detecting emitted radiation. Such techniques may use a variety of sources including isotopic sources, deuterium-tritium neutron generators, or portable linear accelerators. Passive techniques do not involve active bombardment of the material to be measured, but measure some characteristic of the material or constituents of the material using such techniques as calorimetry which involves measuring the heat generated by nuclear materials. Most instrumentation consists of printed circuit boards, electronics equipment, and mechanical assemblies, constructed both in LANL shops and by external vendors.

Environmental Restoration and Waste Management

LANL staff routinely conducts short-term, low-cost environmental actions to reduce risk to human health or the environment from the release or threat of release of hazardous substances. Actions may include excavation or consolidation of contaminated soils or materials; removal of containers of hazardous substances or petroleum products; removal of underground storage tanks; repair or replacement of leaking containers; containment of contaminated soils or sludges; drainage or closing of manmade surface impoundments; use or stabilization of berms or other above- or belowground barriers to the spread of contamination; or installing runoff or runon diversion structures. Additional actions may include segregation of potentially reactive wastes; use of chemicals or other materials to neutralize wastes or to retard the spread of contaminants, or to mitigate their consequences; installation of ventilation systems in soil to remove methane or petroleum vapors; or installation of fences, signs, or other site control precautions. Finally, if the water supply of a household or industry becomes contaminated, an alternative water supply may be provided until the contaminated water source is remedied.

Industrial Hygiene Research and Development

Personnel conduct industrial-hygiene-related research and development activities that anticipate, recognize, evaluate, and control health and safety hazards in the workplace. This work includes design and testing of respiratory protection and other personal protective devices, including respirators, respirator cartridges or canisters, protective suits, self-contained breathing apparatus, and similar equipment. Both commercially-available equipment and LANL-shop-fabricated equipment are used.

High Magnetic Field Research

Researchers study the behavior of materials under very high strength magnetic fields that are produced by pulsed magnets powered by high-voltage stored energy systems. Research is normally conducted at TA-35, Building 125. Magnets currently in operation have maximum magnetic field intensities ranging from 20 to 300 Tesla. Very small samples of a wide variety of materials are studied, and include plutonium-239 and plutonium-242, depleted uranium-238, thorium compounds, high-temperature superconductors, and other metals and semiconductors.

Archaeological Site Evaluation

Qualified LANL personnel evaluate archaeological sites in LANL TAs and surrounding locations (such as U.S. Forest Service land) to establish site integrity that would subsequently be used to determine National Register of Historic Places eligibility. Both invasive and noninvasive evaluation techniques are used. Geophysical instrumentation (such as ground penetrating radar) is used to identify the location of potential subsurface archaeological deposits. Auger holes or shovel tests are used to determine if intact subsurface cultural deposits exist at specific grid locations across the site. Test pits are used to verify the existence of deposits that have been suggested by other tests.

Geology and Geochemistry Research

Basic and applied geology and geochemistry research studies are conducted on rock, concrete, soil, and other geological samples. A number of different activities are conducted, including electron probe microanalysis, infrared spectroscopy, optical microscopy, scanning electron microscopy, wet chemistry analyses, x-ray diffractometry, and acoustical studies. This research is used to quantitatively analyze elements, measure vibrational spectra, determine homogenization and freezing temperatures, determine vibration signals, and a number of other purposes. A variety of equipment (such as electron microprobes, infrared spectrometers, optical microscopes, gas chromatographs, oscilloscopes, and others) and materials are used to conduct the research.

Space and Atmospheric Instrumentation

Flight hardware, satellite instrumentation, and small satellite systems are developed at LANL. Flight hardware and satellite instrumentation are used for remote sensing applications, such as nonproliferation, detection of nuclear explosions, climate studies, and environmental measurements. Types of instrumentation typically developed include optical and infrared remote sensing instruments; x-ray, gamma-ray, neutron, alpha particle, radiofrequency, and energetic particle measurement instruments; astrophysical instruments for conducting studies of the atmosphere, ionosphere, magnetosphere, and solar wind; and other instrumentation for deployment on satellites or other atmospheric testing vehicles. Outdoor experiments are often conducted as part of this research, to measure fluctuations in the atmosphere and ionosphere and to calibrate satellite receivers that are in orbit. Outdoor experiments are conducted at various locations around LANL, the United States, and around the world.

Physical Detector Research and Development

For physical science research, researchers develop and use a wide variety of detectors capable of identifying and measuring ionizing radiation, x-rays, photons, electrical and magnetic fields, chemicals, gases, pressure, gravity, explosives, biological materials, dense materials, and other materials. The detectors consist of a medium that responds to the primary condition of interest, such as liquid (for example, mineral oil), solid (for example, crystalline materials), or gaseous materials (for example, isobutane) in a support housing for mechanical and electrical stability, coupled to electronic circuitry and assemblies. Researchers characterize physical media, then fabricate and test detectors using a variety of equipment and materials.

General Optical Characterization and Calibration

LANL staff performs optical characterization for a variety of applications; this includes measuring solar radiation and reflectance from computer chips and wafer samples. Staff members use light signals such as lamps having different wave lengths, including visible, infrared, ultraviolet, and vacuum ultraviolet. Light is shone onto the component, and calibrated detectors and other measuring devices (such as reflectometers) are used to measure the reflectance or transmission of the light. Low-level lasers are used to align the light signal onto the test component being characterized and onto the detector.

Automation and Robotics Research and Fabrication

Researchers develop automated and robotic systems (such as mills and lathes) in support of the National Nuclear Security Administration's Stockpile Stewardship Program. These systems increase worker productivity, reduce human exposure to hazardous situations, and minimize overall waste production. Prototypes are developed and tested in nonradioactive laboratories, then transferred to radioactive facilities throughout the DOE nuclear complex. Personnel design parts and conduct small-scale production, mechanical and electrical assembly and integration, system operation and integration, and prototype instrument testing on nonhazardous materials.

Ultra-High Strength and High Energy Density Materials Research and Development

LANL researchers investigate, evaluate, and demonstrate new ultra-high strength materials and very high energy density materials. Ultra-high strength materials are produced using a variety of metals, including copper, silver, or aluminum that are encapsulated in glass and heated and drawn into small wires. Thin-film samples of high density materials are synthesized under nonequilibrium conditions. Both materials are characterized by measuring the material composition, chemical structure, mechanical and thermal properties, and energy content and release of these materials.

Materials Characterization Research and Development

Researchers study a number of different materials to determine molecular structure, thermal conductivity, electronic magnetization, heat capacity, thermal expansion, resistance, and other properties. Materials characterized include transition metals and metal oxides, rare earth metal and intermetallic compounds, ceramics, crystals, polymers, amino acids, and others. Personnel prepare samples as necessary and characterize them using equipment such as magnetic resonance imagers, magnetometers, laser interferometers, ultraviolet lights, and x-rays. Research also includes developing techniques for improving equipment sensitivity in detecting certain responses.

Materials Science Research and Development at the Los Alamos Neutron Science Center

Small-scale experiments using the beam at the Los Alamos Neutron Science Center encompass a wide range of research topics, including materials science, engineering, condensed-matter physics, geoscience, chemical science, biological sciences, and fundamental neutron science. Research includes viewing and studying defects in light materials that lie inaccessibly beneath heavy materials, well beyond the range of x-rays; measuring the behavior of materials under extreme conditions, such as high temperature or pressure; studying the interior of materials to obtain either microscopic or structural information; and imaging hydrogenous material, such as water or oil, in parts or components to deduce lifetimes, corrosion, safety, and quality control issues. Both neutron- and proton-induced experiments are conducted.

Electronic and Electrochemical Materials and Devices Research and Development

LANL staff conducts research on electronic and electrochemical materials and devices that are relevant to a wide range of areas, including electrochemistry and the fuel cell program; semiconductor physics research and device development; high temperature superconductivity;

general electronic materials characterization and theory; and nondestructive testing through acoustic techniques. Researchers develop and fabricate prototype electronic and electrochemical devices (including fuel cells, sensors, polymer light emitting diodes, and others) and conduct physical and chemical material analyses in support of these activities. Part of this effort involves synthesizing and processing materials, such as polymers and complex oxides.

Ion Beam Materials Science Laboratory Research

Researchers characterize and modify surfaces using ion beams at the Ion Beam Materials Science Laboratory at TA-3, Building 34. The main experimental equipment includes a 3-megavolt tandem accelerator and a 200-kilovolt ion source implanted together with several beam lines. A series of experimental stations are attached to each beam line; they include the nuclear microprobe, surface modification, ultra-high vacuum, small stainless steel, and general purpose experimental chambers. Samples used in the Ion Beam Materials Science Laboratory include geological samples, metallic films, polymers, ceramics, metal alloys, plutonium-contaminated metal, and metal semiconductors.

X-Ray Tomography and Ultrasound Testing

Researchers x-ray (using computed tomography) and ultrasonically analyze samples of sand, soil, plastics, foam, mock high explosives, composite materials, pressure vessels, or other nonradioactive specimens, as well as specimens containing naturally occurring radioactivity such as rocks and soils. The computed tomography equipment is used to generate three-dimensional images and density maps and to detect cracks or flaws, or precisely locate parts or features within an object. The ultrasonic equipment is used to detect cracks, voids, inclusions, and density variations. Techniques are combined to determine if data from the two methods improves evaluation of the sample.

Basic and Applied Chemistry Research and Development

Chemistry research and development at LANL supports a number of programs. The programs and purpose of chemistry research include: 1) nuclear weapons support that focuses on planning the next generation of nuclear facilities for safely handling actinide metals and their compounds; 2) nonproliferation and counterproliferation and Homeland Security support that focuses on detecting, preventing, assessing, and responding to nuclear, chemical, and biological threats; 3) isotope science support that focuses on the production of medical radioisotopes and the development of a national isotope strategy with other DOE laboratories to rejuvenate the U.S. isotope production capability and encourage research; 4) applied energy research that studies novel methods of hydrogen production, storage, and utilization; carbon measurement, management, and carbon dioxide sequestration; and other research areas; and 5) nanoscale science and engineering that focuses on nanoscale chemical synthesis and processing, chemical kinetics and molecular dynamics, and instrumentation and diagnostics. Chemistry operations are focused on instrumental analysis and spectroscopy, synthetic chemistry, materials chemistry, analytical chemistry and sample preparation, beryllium work, pressure work, radiochemistry and radiological work, biological chemistry, and explosives work. These operations use a variety of equipment and materials and occur LANL-wide.

High-Temperature/High-Pressure Fluids Research and Development

Research is conducted to develop, test, and verify high-temperature and high-pressure fluid technologies, including hydrothermal processing, "supercritical" water oxidation, "supercritical" carbon dioxide, and similar technologies. When certain fluids are driven by high temperatures and pressure to the "supercritical" region, they may be used as a gas and as a liquid. These supercritical fluids are particularly useful as solvents. Researchers explore these technologies by conducting basic research on the physical properties of fluids and other materials, reaction kinetics and process parameters, oxidation and reduction chemistry, and related chemical reactions. They also apply these technologies to many uses, including precision cleaning, extraction of contaminants and residual solvents, chemical synthesis, polymer synthesis, chemical waste destruction (such as hazardous, mixed, or high explosives waste), semiconductor processing, chemical separations, materials modification, and other applications.

Advanced Oxidation Technology Research and Development

Advanced oxidation technology research involves the generation and use of highly reactive free radicals, such as oxygen, hydroxide, hydrogen, and nitrogen, as efficient chemical energy sources for breaking molecular bonds in organic compounds. Advanced oxidation technologies are nonthermal and require no chemical additives; therefore, large secondary waste streams are not generated. Advanced oxidation technology can be used to treat a variety of hazardous components in aqueous- and gaseous-based effluents, such as contaminated soil or groundwater, diesel- or aircraft-engine exhaust, and incinerator offgases. The free radicals involved in advanced oxidation technologies either reduce or oxidize chemicals to simpler, less hazardous, or benign components. Nonthermal plasma is a technique currently used; similar nonthermal techniques are also being studied.

Small-Scale Basic Laser Science Research and Development

Basic laser science research focuses on combining traditional analytical instrumentation with lasers. Research areas include chemical kinetics, materials processing and characterization, fluid chemistry, spectroscopic characterization, chemical diagnostics, and mass spectrometry diagnostics. Researchers use traditional analytical instrumentation and lasers in new ways, for example by combining two methodologies into one instrument, developing field-usable instruments for measuring samples in real-time, developing new sampling techniques, or developing new uses for existing analytical instrumentation. Many types of equipment are used, such as mass spectrometers, radiation detectors, gas chromatographs, infrared and visible lasers, and light detecting and ranging (lidar) systems.

Advanced Image Sensor Research and Development

Sensitive and fast sensors and imaging systems are developed for weapons and nonweapons applications, including "smart" weapons, tracking systems, and high-speed data acquisition. Equipment used to develop these sensors and imaging systems includes computers, oscilloscopes, volt meters, arbitrary function generators, image monitors, optical light sources, high-voltage power supplies, charge-coupled device cameras, commercial image intensifiers, and lasers.

Electronic Control Systems Fabrication

Electronic control systems are fabricated for industrial, academic, and Federal agency applications. These systems control many different apparatuses, such as remote-handling systems, radiofrequency systems, lasers, experimental devices, surveillance equipment, alarm and safety equipment, measurement systems, and many others; they monitor performance, control operating parameters, and serve other similar functions. Personnel construct control systems, write software to control those systems, and then integrate them with the apparatus being controlled.

Energetic Neutral Beam Facility Research and Development

The Energetic Neutral Beam Facility, located at TA-46, Building 31, consists of two neutral beam sources, and is used by personnel from other Federal agencies, universities, and industry. The beam sources have diagnostic capabilities that include mass spectrometry and time-of-flight. The primary activity at this facility is to investigate surfaces, specifically gas-surface interactions, including scattering or reaction mechanisms, or both. Thin film work and detector studies using sealed sources are also conducted. The first beam source produces continuous high energy atomic beams with energies from approximately 1 to 5 electron volts. The second beam source is a continuous medium-energy molecular beam source.